UCRL-AR-122192

Environmental Protection Department

Statement of Work
for
Analytical Services in Support of the Environmental Protection Department Lawrence Livermore National Laboratory

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D. Silberman
J. Bazan
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July 1, 1995

Lawrence Livermore National Laboratory
University of California Livermore, California 94551

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STATEMENT OF WORK
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STATEMENT OF WORK

Note: *This Statement of Work addresses all the various analytical laboratory requirements of the Lawrence Livermore National Laboratory's Environmental Protection Department. The Department collects samples requiring two main types of analysis: (1) nonradiological analysis of nonradiological environmental samples, and (2) radiological and nonradiological analysis of samples potentially contaminated with chemical, radioactive, or mixed constituents. These latter may be environmental, waste, or hazardous waste samples.*

Because the two categories of analysis require different laboratory conditions and techniques, they are covered under two different Blanket Service Agreements. Therefore, some requirements described in this overall Statement of Work may not apply to a specific Blanket Service Agreement's scope of work. In that case, they may be considered to be self deleting.

SECTION I – INTRODUCTION AND PURPOSE

This Statement of Work (SOW) defines the requirements for performing and reporting analytical results of samples from Lawrence Livermore National Laboratory (LLNL) and its surrounding areas. Analysis of these samples is required to support a number of ongoing activities, such as environmental remediation, environmental monitoring, regulatory permitting, and waste characterization and certification for off-site disposal. Responsibility for these activities lies with EPD. The services provided under the Blanket Service Agreement (hereafter Agreement), to which this SOW is attached, shall support the regulatory compliance and environmental protection activities of the Environmental Protection Department (EPD).

A number of EPD users are covered under this SOW, each with a slightly different protocol and requirements. Therefore, the Agreement specifies that the Subcontractor be familiar with each user group and its needs, as indicated in this SOW or conveyed during work performed over the term of the Agreement. To assist the Subcontractor in understanding the different user groups and their analytical requirements, the following is a description of the six primary user groups covered under the Agreement:

Operations and Regulatory Affairs Division (ORAD)

ORAD's operational and regulatory compliance activities require routine and specialized chemical and radiological analyses of environmental and waste samples in various media, including air, soil, water, and RCRA solid waste. The analyses required include STLC and TTLC metals, volatile and semivolatile organics, PCBs, RCI, oil and grease, fish bioassay, total petroleum hydrocarbons, gross alpha and beta, tritium, and gamma spectroscopy. U.S. Environmental Protection Agency and U.S. Department of Energy moratorium methods are used.

When analytical requirements change, ORAD shall require consultation and a timely resolution of issues so that its operations are not adversely affected.

Environmental Monitoring Program (EMP)

EMP, which is part of ORAD but functions as a separate user group, performs routine monitoring of potentially affected media to determine the environmental impact of operations at LLNL. This requires high-sensitivity analyses of various matrices, primarily water, air filters, soil, and sewage. EMP typically is interested in very low detection limits and mostly measures analytes at background levels. A wide range of analytical methods, including radiological analyses, is required. For radiological analyses, EMP requires that its samples be segregated from high-level samples. The sample load is predictable, and electronic downloads are required. EMP shall require open and cooperative investigation on any anomalous results.

Hazardous Waste Management Division (HWM)

HWM samples come from three major areas. First, waste from generators is sampled to determine if it is hazardous, radioactive, or mixed. Second, 10% of the wastes received at HWM are randomly sampled for waste verification. Third, samples are generated from the aqueous treatment facility, including samples from a process in which mixed waste is stabilized and rendered radioactive-only. Samples from generators come from many different sources at LLNL, including research projects that use tritium, uranium (natural, enriched, and depleted), radioactively labeled compounds for biomedical research, and mixed fission products from energy and weapons-related research. Samples from the treatment facility consist of hazardous, radioactive, and mixed wastes from the tank farm, the stabilization unit, the microfiltration unit, and the treatability studies laboratory. The analyses required by regulatory agencies for these samples include TCLP and STLC metals, TCLP volatiles and semivolatiles, alpha and gamma spectroscopy, oil and grease, cyanide, sulfide, PCBs, pH and the Paint Filter Test.

Waste Certification Program (WCP)

WCP is responsible for certifying low-level radioactive waste for shipment to the Nevada Test Site, currently the only disposal site available to LLNL for this waste. The stringent rules for the certification process are specified by DOE's Nevada Operations Office (DOE/NV). The major purpose for analyzing the low-level radioactive waste is to prove that it contains no hazardous materials above applicable regulatory limits, therefore precluding it from being classified as mixed waste. The most common types of analyses include STLC metals; TCLP volatiles and semivolatiles; PCBs; as well as tritium, alpha, and gamma spectroscopy. Samples include various types of environmental media, such as soil and gravel, as well as stabilized waste from the aqueous treatment process (described in the section above on HWM). Although the number of samples submitted by WCP is small compared to other user groups, it requires full, hard copy Contract Laboratory Program (CLP) reporting packages (as differentiated from CLP analysis) for all samples, and the data

shall be validated using EPA guidelines. The Subcontractor shall be required to work closely with the WCP point-of-contact to provide all the information required by DOE/NV to verify proper oversight of the analytical laboratory, as defined herein.

Environmental Restoration Division (ERD)

ERD handles the CERCLA activities at the Livermore Main Site and Site 300, both Superfund sites. ERD investigates and remediates contamination of soil and ground water. ERD's regulatory compliance, monitoring, and remediation activities require rush, routine, and specialized chemical and radiological analyses of environmental samples from various media, including air, soil, and water. ERD may also require development of performance-based methods for various media and contaminants. ERD requires resolution of issues in a timely manner to accommodate the operational nature of its activities.

Chemistry & Material Sciences Environmental Services (CES)

CES is fundamentally different from the other user groups in that it is an on-site laboratory certified by the California Department of Health Services as well as a Sample Management Program that serves many of the other user groups. The CES laboratory maintains certification for wastewater, hazardous waste, and radiological analyses and performs hazardous, radiological, and mixed waste analyses for waste characterization and verification. CES also provides technical expertise and advice to the other user groups.

The CES Sample Management Program processes samples from other user groups for shipment to off-site laboratories. It provides a full range of services including documenting, screening, and shipping samples off site. It serves as the primary contact for off-site laboratories. All waste samples from HWM and WCP are processed through CES. Samples from ORAD for other than radiological analyses are also processed through CES. The vast majority of EMP samples and all ERD samples are sent directly to the off-site laboratory by CES.

SECTION II – TECHNICAL SCOPE OF WORK

The Subcontractor shall furnish all personnel, supervision, materials, supplies, facilities, transportation, testing, and other items and services necessary for performing this work, except as specified herein to be furnished by the University.

The University may direct changes within this SOW, as provided in the clause of the General Provisions entitled CHANGES FIXED-PRICE (AUG 1987).

The work is described below.

A. General Requirements

The Subcontractor shall provide analytical services, as identified in Attachment 1 of the Agreement, Fixed Rate Pricing Schedule, consistent with the estimated volume

of work indicated therein. In addition to those tests identified in Attachment 1, the Subcontractor shall also have the capability (either in-house or through sub-subcontract arrangements, subject to limitations discussed herein) to provide any other commonly accepted analytical services that are consistent with the scope of work for the Agreement. Any additional test shall be added consistent with the Changes Clause of the Agreement. The analytical methods for these services are defined by EPA, the State of California Department of Health Services (DHS), the American Society for Testing and Materials (ASTM), and method compendia such as the Standard Methods for the Examination of Water and Wastewater, plus requirements defined in this SOW.

Any requirements stated in this SOW shall apply to the Subcontractor as well as to any sub-subcontractors used in performance of this work.

B. Specific Technical Requirements

1. QA/QC and Certification Requirements

a) Quality Assurance Standards

Throughout the term of the Agreement, the Subcontractor and any approved sub-subcontractors shall maintain a written and implemented quality assurance/quality control (QA/QC) plan that, at a minimum, meets the requirements of DOE Order 5700.6C, Quality Assurance Program Implementation Guide, dated 8/21/91 (Enclosure A to this SOW). The Subcontractors providing radiological analyses must have a quality assurance program that meets the requirements of the American National Standards Institute/American Society of Mechanical Engineers' (ANSI/ASME) Nuclear Quality Assurance program NQA-1-1989.

The Subcontractor and any approved sub-subcontractors shall, throughout the term of the Agreement, distribute to EPD's Assurance Manager controlled copies of their quality assurance plan and applicable standard operating procedures, including any periodic revisions. The EPD Assurance Manager shall reserve the right to review and approve all revisions.

b) Certification Requirements

i) Analytical Certification

Throughout the term of the Agreement, the Subcontractor and any approved sub-subcontractors shall maintain a DHS Environmental Laboratory Accreditation Program (ELAP) certification for analytical tests identified in Attachment 1 of the Agreement, Fixed Rate Pricing Schedule, for which the DHS offers certification, as well as for any tests that may be added at a later date through the Changes Clause. Copies of relevant state and federal certificates of analysis shall be provided to the EPD Assurance Manager upon request.

Those Subcontractors who perform analyses on waste samples must also maintain, throughout the term of the Agreement, a State of Utah certification for all analytical tests (as identified in Attachment 1 of the Agreement, Fixed Rate Pricing Schedule) for which the State of Utah offers certification, as well as for any tests that may be added at a later date through the Changes Clause.

The following documentation may be requested and shall be provided to the LLNL user:

- Laboratory facility and equipment listings.
- Quarterly organization chart updates.
- Resumes for all relevant personnel shown on the organization chart who are involved with LLNL sample analyses.
- Copies of Nuclear Regulatory Commission/state license, California and Utah certifications as required.

ii) Radioactive Material Handling Certification

Those Subcontractors and approved sub-subcontractors who perform radiochemical analyses shall also maintain a certification from the Nuclear Regulatory Commission or their appropriate state agency to accept and analyze radioactive samples with an activity level of less than, or equal to, 100 microcuries per sample.

c) Performance Evaluation Requirements

i) Inter-Laboratory Comparison Programs

Throughout the term of the Agreement the Subcontractor and any approved sub-subcontractors shall maintain participation, as applicable, in California-, Utah-, DOE- and/or EPA-approved inter-laboratory quality assurance programs such as EMSL, EML, WP, or DP. Present and future programs in which the Subcontractor and sub-subcontractors participate, and which are relevant to this Agreement, must be acceptable to, and approved in writing, by the EPD Assurance Manager.

Subcontractors and any sub-subcontractors shall provide the EPD Assurance Manager with:

- The unique laboratory identification codes for each approved inter-laboratory comparison program in which the Subcontractor and sub-subcontractors participate.
- A hard copy report of the results of each inter-laboratory comparison study within 30 calendar days of its publication.
- A written explanation for any unacceptable results identified by the inter-comparison programs within 30 calendar days of the

publication of the results. The explanation must include a determination of the root cause and a schedule of corrective action to be taken to resolve the problem and prevent its recurrence.

- Names and phone numbers, upon request, of agency contacts for all Performance Evaluation studies, so that the LLNL user group may contact them for verification of report accuracy when required.
- Copies of correspondence sent to any state or federal Performance Evaluation program due to unsatisfactory performance.

ii) Internal Quality Control

Table 1 lists the minimum requirement for internal quality control when such controls are applicable to the particular analytical methods. The table identifies the QC activity, the applicable type of analysis, and the minimum frequency of analysis allowable under the Agreement. For the purposes of this table, a batch is defined as less than, or equal to, 20 samples.

iii) Analytical Control Limits

The EPD Assurance Manager shall approve the analyses control limits provided by the Subcontractors and sub-subcontractors. The basis for these control limits, the source method from which they were derived, and the method for keeping the control limits current must also be provided.

iv) EPD Performance Evaluation Samples

Periodically at the discretion of the EPD Assurance Manager, LLNL shall provide samples to Subcontractors and sub-subcontractors to be analyzed for the purpose of evaluating their performance. The results of these analyses shall be reported according to Section 2, Deliverables, of this SOW.

Subcontractors and sub-subcontractors shall be required to provide to the EPD Assurance Manager a written explanation addressing any unacceptable results related to the analysis of EPD Performance Evaluation samples. The written explanation must include a determination of the root cause, proposed corrective actions, and a corrective action implementation schedule to resolve the problem to prevent its recurrence.

Failure to perform satisfactorily in the analysis of the EPD Performance Evaluation samples may result in penalties up to and including cancellation of the Agreement.

Table 1. Minimum Quality Control Requirements.

Required QC Activity	Applicable Type of Analysis	Frequency Provided to LLNL
QC Control Charts	All	Upon Request
Control Limits	All	With Each Sample Batch
Method Detection Limit (MDL) Studies	All	At Least Every Six Months
Matrix Spikes (MS)	All	With Each Sample Batch
Matrix Spike Duplicate (MSD)	Nonrad Analyses Only	With Each Sample Batch
Laboratory Control Samples (LCS)	All	With Each Sample Batch
Method Blanks (MB)	All	With Each Sample Batch
Surrogates	Nonrad Analyses Only	With Each Sample Batch
Ongoing Calibration Checks	All	With Each Sample Batch
Sample Duplicates	Rad Analyses Only	With Each Sample Batch
Initial Calibration	All	Upon Request

d) Audits and Assessments of Subcontractors and Sub-Subcontractors

i) Annual Audits of Subcontractor

The Subcontractor shall be available for audits to verify past performance and current capabilities. Each Subcontractor's facility must be audited at least annually. A minimum of a 24-hour notice shall be given prior to any facility audit. The audit scope shall include, but not be limited to:

- QA/QC program
- Analytical instrumentation (including calibration)
- Sample control (i.e., receipt, storage, tracking, etc.)
- Operating procedures
- Analytical methods (including QC compliance)
- Document and record management
- Training
- Waste management
- Data validation and reporting.

Previous audit reports and documented corrective actions shall be made available for inspection upon request.

ii) Assessments of Subcontractor and Sub-subcontractors

Subcontractors shall extend the requirements of the Agreement to all sub-subcontractors employed in the analysis of EPD samples. Subcontractor oversight responsibilities are addressed under Section 3, Subcontracting, of this SOW.

Sub-subcontractor facilities shall be open to audit by the University, at the discretion of the EPD Assurance Manager.

2. Deliverables

The following shall be the specific deliverables of the Agreement and the requirements associated with them.

a) Requirements for Hard Copy Deliverables

i) Case Narrative

A Case Narrative, on Subcontractor letterhead, shall include:

- LLNL's sample identification and corresponding Subcontractor identification.
- Requested analysis for each sample and the methodology used.
- Detailed description of all problems encountered.
- Discussion of possible reasons for any QA/QC criteria outside acceptance limits.
- Observations regarding any occurrence that may affect sample integrity or data quality.
- Indication of whether holding times were exceeded.
- Authorization by the Subcontractor manager for release of the data.

The Case Narrative shall also indicate when any of the hard copy deliverables have been revised, why and under whose direction the revision was done, and what changes were made.

ii) Chain-of-Custody (COC) Documentation

A legible copy of the completed COC documentation shall be included as part of the hard copy deliverables. The COC shall indicate:

- The appropriate receiving and relinquishing signatures and dates.
- The observed sample condition at the time of receipt, described either on the COC or its attached sample receipt form. The LLNL technical contact shall be notified immediately by telephone of any sample receipt problems such as broken or damaged containers, discrepancies between sample bottles and/or labels and the COC, improper preservation temperature, broken COC seals, etc. In

addition, a copy of the COC or sample receipt form indicating the problem shall be faxed to LLNL.
- The fax number, telephone number, or e-mail address of any individuals requiring expedited results, as provided by LLNL.
- Any special instructions as provided by LLNL. The Subcontractor shall provide full CLP hard copy packages and CLP data diskettes as further defined below in Subsection 2.a.vi.

iii) Sample Retention

Samples shall be retained for a minimum of 30 days following the delivery of the signed hard copy package of documents.

iv) Summary of Results

Hard copy reports shall be identical to the electronic report generated from the original data source (see Subsection 2.b.i below) and shall include for each sample:

- LLNL's sample ID and the corresponding Subcontractor ID.
- Sample matrix.
- Date/time and method used for sample extraction, if applicable.
- Analysis method and LLNL analysis method code.
- Date/time of analysis.
- ID of the instrument used for analysis.
- Dilution or concentration factor of the samples.
- The LLNL reporting limit as indicated in the Attachment 1 of the Agreement, Fixed Rate Pricing Schedule.
- Definitions for any data qualifiers used.
- Analytical results (concentration or activity detected in the sample) in units as indicated in the Attachment 1 of the Agreement, Fixed Rate Pricing Schedule.
- LLNL code for each parameter.
- The analytical chemist's ID number.
- Sample collection date and date the Subcontractor received the sample.
- Project ID number and COC number.

v) Summary of QC Sample Results

The University reserves the right to reject for payment any analytical reports that fall outside the established QC limits. A summary of QC sample results shall be provided for each sample and shall include:

- Continuing calibration batch number, date/time of analysis, instrument ID number, analyst ID number, method number,

theoretical result, actual result, percent recovery, and acceptable range.

- Method blank data, batch number, date/time of analysis, instrument ID number, analyst ID number, and method number.
- Surrogate recoveries, if applicable.
- Sample duplicate results, if applicable.
- Matrix spike (MS), spike duplicate (MSD) data, batch number, date/time of analysis, instrument ID number, analyst ID number, method number, and sample result when indicated by the method.
- Laboratory control samples or standards (LCS) data, batch number, date/time of analysis, instrument ID number, analyst ID number, and method number.
- QC control limits for LCS, MS/MSD, and surrogates.

In addition, the Subcontractor shall maintain the following information and make it available upon request.

- Initial instrument calibration data.
- Data on how retention time windows are determined.
- Compound identification (retention times and concentration of each analyte detected).
- Method detection limit determinations.
- Laboratory QC control charts.
- GC/MS tune data.

vi) CLP Deliverables for Waste Certification (only)

Full CLP hard copy packages and CLP data diskettes *may be required* by LLNL. The format for the data diskettes will be Agency Standard Format as specified in the 3/90 CLP Statement of Work (OLM01.8 for Organics and ILM03.0 for Inorganics). In a limited number of cases, the earlier CLP Format A, based on the CLP 2/88 Statement of Work, may be required by LLNL. For applicability and an estimate of the number of CLP deliverables required, see Attachment 1 of the Agreement, Fixed Rate Pricing Schedule. *The Subcontractor shall not provide CLP analyses or original instrument strip chart tracings, only the CLP reporting format.* This shall include summary packages plus the remainder of the data package including, if applicable, initial and continuing calibration, matrix spikes, matrix spike duplicates, blanks, duplicates, surrogate recoveries, chromatograms, mass spectra, standards preparation, run logs, and absorbency data, as well as any other information necessary to validate the data.

vii) Hard Copy Retention

All raw sample and QC hard copy data are considered QA records and must be maintained for the life of LLNL. The Subcontractor shall retain all

related project information for a minimum of 3 years, after which the Subcontractor may turn it over to LLNL for storage.

viii) Validation

Data packages will be validated at LLNL. For results that cannot be validated through the standard report package, the Subcontractor shall submit additional related documentation, such as raw data, to LLNL upon request and at no additional charge.

On a quarterly basis, the University has the option to request Level IV QC summary tables and raw calibration data for a select number of data packages. The University shall reserve the right to perform a semiannual evaluation of all QA/QC data at the Subcontractor facility. This shall include calibration information and raw data validation on a select number of data packages. The level of semiannual QC data reviews shall be dependent on Subcontractor performance.

b) Electronic Data Deliverables (EDD)

i) LLNL Format Electronic Data Deliverables

Electronic versions of sample, analytical, and related QC data shall be delivered. (*The hard copy reports must be identical to the electronic copy, i.e., generated from the electronic report version.)* By "electronic version" the University means a version having data generated directly from the Subcontractor's Laboratory Information Management System (LIMS) or some other original data source, not from a manually entered secondary electronic file.

For work that is performed by sub-subcontractors, the sub-subcontractor shall be responsible for preparation of the electronic deliverables and shall be subject to the same requirements and guidelines as the Subcontractor. In certain circumstances the University may, at its own discretion, choose to waive this requirement for sub-subcontractors. However, any such waiver shall be in writing and on a case-by-case basis. Specifications for a transmission batch are fully described in Enclosure B to this SOW, Specifications for Transmitting Analytical and QA/QC Data from an Outside Analytical Laboratory, to Environmental Protection Department, Lawrence Livermore National Laboratory. Each transmission batch shall include four files:

- Sample File, containing descriptive information about the collected sample, as provided by LLNL on the chain-of-custody form;
- Analysis File, containing information about the analysis performed on the samples, including methods used and results obtained;

- QA/QC File, containing information about the QC samples and their analytes;
- Batch Number Reference File, containing batch numbers and corresponding laboratory log numbers for samples supported by that batch.

All analytical work shall be delivered electronically in this four-file format, with the exception of specialty analyses whose results do not lend themselves to the specified format, e.g., EPA 1002 Gross Algae Test, EPA 1003 Water Flea Test. Tests to be excluded from electronic data delivery shall be mutually agreed upon by both LLNL and the analytical laboratory before analysis is performed.

The University reserves the right to update the reporting requirements, conforming to any nationally accepted DOE EDD standard, as necessary.

EDD transmission batches shall be delivered at regular, semimonthly intervals. Hard copy reports should be available at LLNL while the EDD is being processed. Prior to electronic delivery of the files, the Subcontractor shall deliver to LLNL, via fax or e-mail, a listing of samples to be contained in the transmission batch. Occasionally, LLNL may request transmission or more batches, in order to obtain necessary results in a timely manner.

ii) CLP Format A Electronic Data Deliverables

In addition to hard copy, CLP data files shall also be submitted on diskette and sent by U.S. Mail or e-mail to a specified LLNL address. The electronic versions shall be in an ASCII format.

c) Courtesy and Official Invoices

An *unofficial invoice file copy* , or courtesy invoice, shall accompany the hard copy results. The official invoices shall be submitted upon successful completion of the work, accompanied by a copy of the LLNL COC. Additionally, there shall be one invoice per release and the release number must be indicated on the invoice.

d) Distribution of Analytical Analysis Reports

- Hard Copy Original Reports - Shall be addressed and mailed according to instructions typed or written on the COC documentation.
- Facsimile Reports - Shall be faxed to the individual and phone number identified on the individual COC documentation.
- Electronic Mail - Shall be mailed to the individual and e-mail address identified on the individual COC documentation.

- Electronic Reports - Shall be transmitted by an acceptable mode to LLNL, according to specifications indicated in Enclosure B to this SOW.

e) Interim Reports

It is understood that there shall be other information exchanged between parties from time to time. These data may be exchanged directly between the parties concerned; formal reporting and distribution are not required in these cases.

Subcontractors shall not distribute reports of work performed under the Agreement to any individual or organization, other than indicated above or to an authorized representative of the DOE, without prior written approval of the University's Subcontractor Administrator.

f) Turnaround Times

Turnaround time is defined under Subsection 4.c.i, Sample Retrieval (Sample Delivery). The turnaround times for official packages delineated in Attachment 1 of the Agreement, Fixed Rate Pricing Schedule, are the scheduled dates when official results must be received by LLNL. An official data package includes the sample results with the Subcontractor's signature and accompanying QA/QC results. The turnaround times for unofficial packages are the schedules when LLNL must receive preliminary results by fax, e-mail, or verbally, as requested on the COC. *Only receipt of the official report shall constitute the basis for payment.* LLNL reserves the right to request preliminary results for all tests even when there is no preliminary turnaround time defined in the above-noted Attachment 1. These turnaround times are defined in calendar days and include any vacation days or holidays.

g) Methods and Reporting Limits

The Subcontractor shall be required to have the capability to perform the analyses specified in the Attachment 1 of the Agreement, Fixed Rate Pricing Schedule. The Subcontractor's reporting limit shall not exceed that specified for each analysis in Attachment 1. Reporting limits may only be exceeded when the sample matrix must be diluted for analysis. In this case, the Subcontractor shall report the adjusted reporting limit for the sample, along with a short justification for exceeding the specified reporting limit.

When the reporting limit for organics is increased to 10 µg/L or greater, LLNL requests that any undiluted concentrations available also be reported.

3. Subcontracting

This section covers the analyses that the Subcontractor must turn over to others. This work is of two kinds: work lasting 120 days or less, and longer-term

situations where the Subcontractor needs the support of other laboratories on a continuing basis.

Analyses to be performed by sub-subcontractors must be identified and approved, using the methods described below. Under the Agreement, satellite facilities under the same ownership as the Subcontractor's main facility shall be considered sub-subcontractors.

a) Short-Term Support

The Subcontractor may, for a variety of reasons, find that it temporarily cannot perform an analysis or meet the required specifications of the Agreement. If this situation will be in effect for fewer than 120 days, the Subcontractor shall be directed to send the sample, at its own expense, to one of LLNL's other subcontractors for analysis. As soon as the Subcontractor determines that it cannot provide the service, it shall contact the LLNL analysis requester to obtain verbal permission for submitting the sample to an alternative analytical laboratory. At the discretion of the LLNL analysis requester, the Subcontractor may be directed to submit the sample to a specific laboratory or be provided with a list of laboratories from which it may choose.

In these instances the University shall not be obligated to pay the Subcontractor for any costs associated with the sample in question. Any obligation for payment shall be between the University and the alternate LLNL subcontractor. Once the Subcontractor has been directed to send samples to another LLNL subcontractor, the responsibility for the analysis, data deliverables (including electronic data delivery), COC documents, and hard copies of data shall belong to the alternate LLNL subcontractor. However, this does not relieve the original Subcontractor from any penalties (see Section 5, Penalties, of this SOW) that may apply if holding times and other deliverables for the analysis cannot be met, through the fault of the Subcontractor.

The Subcontractor may choose to direct LLNL not to submit certain kinds of analytical work to them during periods when it is unable to meet the requirements of the Agreement. In this case, LLNL will submit the samples to an alternate laboratory directly.

If the Subcontractor wishes to use alternative laboratories for time periods exceeding 120 days, it must obtain written permission from the LLNL analysis requester.

b) Long-Term or Ongoing Support

The Subcontractor may, after the Agreement has been awarded, determine that it does not plan to provide a given analytical service but instead have the analytical service performed by a laboratory under contract to it. This is

considered a sub-subcontract relationship and is subject to sub-subcontract pre-approval and ongoing conditions as described in this section.

LLNL has identified specific analyses that may not be sub-subcontracted by the Subcontractor. These are noted in Attachment 1 of the Agreement, Fixed Rate Pricing Schedule. In addition, at no time throughout the term of the Agreement shall the Subcontractor subcontract more than 20% of the individual tests identified as permissible for subcontracting by Attachment 1.

The following conditions shall apply to the Subcontractor for all sub-subcontracted work under this SOW:

- The Subcontractor retains all responsibility and liability for work and obligations of sub-subcontracted activities under the Agreement.
- No requirements of this SOW may be waived for sub-subcontracted work by the Subcontractor. LLNL may, on a case-by-case basis, provide written waivers under special conditions.
- The Subcontractor must pre-qualify any sub-subcontractor at its own expense.
- LLNL must approve all sub-subcontractors based upon the requirements listed below.
- The Subcontractor shall perform ongoing assessments of the sub-subcontractor, at the its own expense, to assure the quality of the work being performed. The assessments shall include periodic sampling verification for quality control or performance evaluation.
- If changes in sub-subcontractor laboratory operations are sufficient to possibly alter data quality for LLNL samples, the Subcontractor must notify LLNL within 30 days of the deficiency and provide LLNL with a corrective action plan, schedule, and documented verification that the deficiency is being corrected.
- All final data and associated quality control information for LLNL samples from sub-subcontracted analyses must be reviewed and verified by the Subcontractor. LLNL will hold the Subcontractor responsible for the quality of sub-subcontractor data.
- All final data and associated quality control information for LLNL samples from sub-subcontracted analyses must be transmitted to LLNL in the same format and with the same turnaround time requirements as for samples performed under the Agreement. The Subcontractor is responsible for transmitting all deliverables for sub-subcontracted work.
- All sub-subcontractors must possess current State of California certifications (and Utah, if applicable) for the analyses they perform.

- Sub-subcontract laboratory facilities must show openness and cooperation during LLNL and Subcontractor investigations of data anomalies.

c) Sub-Subcontract Laboratory Approval Process

Requests for sub-subcontracting may be submitted for LLNL approval at any time. A Subcontractor shall not submit LLNL samples to another laboratory without prior approval from the LLNL analysis requester.

Only analyses originally identified for be sub-subcontracting may be analyzed by other than the Subcontractor. If the Subcontractor determines that a sub-subcontract arrangement for a particular analysis is required, it must notify the EPD Assurance Manager in writing. The Subcontractor shall indicate whether the identified sub-subcontracting laboratory is providing or has recently provided this service to the Subcontractor. The Subcontractor shall have 60 days, after its notification of intent to sub-subcontract, to submit the necessary information (described below) to LLNL for review, comment, and approval of the sub-subcontractor(s).

The following information shall be submitted by the Subcontractor to the LLNL EPD Assurance Manager for approval of a sub-subcontract laboratory:

- The analyses to be performed, including the sample matrices.
- The reporting limits to be achieved.
- The name, address, and State of California ELAP certification number (and the Utah certification number, if applicable) of the recommended facility .
- Documentation to show that the Subcontractor has reviewed and accepts the quality assurance plan and relevant operating procedures of the sub-subcontract facility.
- Documentation to show that the Subcontractor has made a facility assessment of the sub-subcontract facility.
- Documentation of any deficiencies noted during the review of the sub-subcontractor facilities, documents, and processes, and a corrective action plan and schedule to correct the noted deficiencies.
- Documentation of Performance Evaluation samples that were submitted by the Subcontractor to the sub-subcontractor to evaluate data quality. Documentation should include the source of the initial sample, the expected value, the value and uncertainty reported by the sub-subcontracted laboratory with any additional quality control data. Samples should span the concentration range and matrices that will indicate the performance of the sub-subcontracted laboratory for the required analyses.

NOTE: The same requirements as specified in the Quality Assurance section (Section 1 above) of this SOW apply to the sub-subcontract facility.

LLNL shall review and comment on sub-subcontract qualifications documentation within 10 business days after receipt. *LLNL must provide written approval prior to use of a sub-subcontracted laboratory.*

4. Management of Samples and Waste Disposal

a) Radioactivity Assessment

LLNL samples generally fall into two categories: environmental samples with varied but low levels of hazardous and radioactive constituents, and waste samples with varied but typically higher levels of hazardous and radioactive constituents. The majority of the samples are far below the level of the Department of Transportation's (DOT) “radioactive” sample designation. This includes the majority of the samples to be submitted for radionuclide analyses.

The means by which LLNL assesses the level of radioactivity in samples prior to shipping them depends upon the type of sample.

Environmental samples are evaluated based upon historical and process knowledge. Environmental samples below DOT levels will not be labeled “radioactive.” The tritium level in environmental water samples will range from background to 600,000 pCi/L; in other matrices it will range from background to 100,000 pCi/g. The gross alpha levels of samples will range from background to 300 pCi/L, and the gross beta levels of samples will range from background to 300 pCi/L. A copy of LLNL's current annual Environmental Report will be supplied, upon request, to provide an indication of the levels of radioactivity that can be expected in environmental samples.

All waste or known radioactive samples are screened by liquid scintillation or gas proportional counting to determine activity, and the sample container is labeled with the screening value. For the purpose of off-site analyses, a sample that the generator states is radioactive or has a screening value greater than 100 dis/min/mL or 100 dis/min/g is considered to be radioactive or potentially radioactive. When the radioisotopic makeup of the sample is unknown and is screened by liquid scintillation, the activity is conservatively assumed to be due to tritium.

A table of the activity ranges of 1,140 screened samples from 1992 is shown below. The distribution indicates that approximately 95% of the samples have an activity below 1,000 dis/min/mL. A similar activity distribution is expected in the future.

Nonradiological samples may originate from areas and/or from waste streams of no known radiological history or may show no radioactivity upon screening. For the purpose of off-site analyses only, a sample is considered to be nonradioactive when the LLNL generator states it is nonradioactive and has a

Table 2. Activity Ranges to Date for 1992 Samples (assumes tritium counting efficiency).

Activity Range (mL or gram)		
dis/min (mL or g)	picocuries (mL or g)	% of samples
<25	<12	44
26 to 100	12 to 45	36
101 to 10^3	45 to 450	16
10^3 to 10^4	450 to 4,500	3
10^4 to 10^5	4,500 to 45,000	1.2
10^5 to 10^6	45,000 to 450,000	0.6

screening value less than 100 dis/min/mL for a liquid sample or 100 dis/min/g for a solid sample.

b) Low-Level Radiological Analysis Requirements

Environmental samples are normally included in the nonradioactive sample list. However, some of these samples may require radiological analyses. Any *environmental radiological analyses* requested for these samples must be completed in a *low-level radiological* laboratory with appropriate temporal and spatial segregation of samples, equipment, lab space, and lab ware to assure the integrity of analysis of samples with natural levels of radioactivity.

c) Management Handling of Samples

i) Sample Retrieval (Sample Delivery)

Subcontractors that are required to be within a 4-hour drive from LLNL shall be responsible for picking up all samples at a pre-designated LLNL location. For the purpose of calculating sample turnaround time, the start time is considered to be 24 hours after LLNL's notification for sample pickup or the verified time of sample receipt at the lab facility, whichever comes first. If samples are shipped, the turnaround time calculation starts 24 hours after the samples leave the LLNL facility or the verified time of sample receipt at the lab facility, whichever comes first. For 24-hour turnaround or less, counting shall begin at the time the sample is picked up.

Subcontractors that are more than a 4-hour drive from LLNL may use a common carrier such as Federal Express, UPS, Emery or any other courier that has access to LLNL. The Subcontractor shall incur the expense for this method of sample pick-up. When handling the samples, the Subcontractor shall be required to follow all of LLNL's chain-of-custody procedures.

ii) Radioactive vs. Nonradioactive (Sample Receipt)

The Subcontractor shall document sample receipt and provide this documentation with the hard copy deliverables. LLNL shall be notified immediately if there is a discrepancy in the chain of custody or if the integrity of a sample has been compromised.

The Subcontractor shall have implemented an in-house tracking procedure(s) for the distribution, segregation, preparation, analysis, and disposal of samples.

The Subcontractor shall segregate nonradioactive, environmental, and radioactive samples at the time of receipt, and this segregation must be maintained throughout sample inspection, storage, and analysis. The samples transferred to the Subcontractor's custody shall be kept in an appropriate sample storage facility in accordance with EPA and DHS regulations for sample storage, preparation, and holding times. DHS-approved sample handling and custodial procedures shall be maintained and followed.

Additionally, the Subcontractor shall:

- Thoroughly document sample receipt, noting such things as broken or damaged containers, excessive headspace, sufficiency of sample volume for analysis, discrepancies between sample bottles and/or labels and the chain of custody, whether the samples arrived at the proper preservation temperature, problems with the accompanying paperwork, whether chain-of-custody seals have been broken, etc., and shall fax a signed copy of this documentation to the appropriate contact on the same day of sample receipt.
- Immediately contact the LLNL user group about any problems with sample receipt that might affect analytical results (for example, exceeding sample holding time), so that a timely decision can be made about whether to proceed with the analysis.

iii) Sample Retention

After the final analysis report is generated and verified by LLNL, the Subcontractor shall hold samples for a period of 30 days, using appropriate sample segregation procedures.

d) Waste Disposal

i) Unused Samples

The Subcontractor shall dispose of all unused sample portions in accordance with its written procedures for disposing of LLNL's samples,

which have been approved by LLNL in the pre-award audit or later prescribed in writing.

Samples may be returned to LLNL only with the authorization of the requester. Returned samples shall be sent back at the Subcontractor's expense, must be in their original bottles with the original sample labels, and must be returned within 90 days of analysis completion.

ii) Generated Waste

The Subcontractor shall be responsible for disposing of any waste generated from sample analysis, in accordance with appropriate state and federal guidelines governing the disposal of hazardous waste.

Throughout the term of the Agreement, the Subcontractor shall follow and maintain its internal hazardous waste management plan for the segregation, accumulation, storage, and disposal of hazardous waste. Furthermore, the Subcontractor shall certify that its internal hazardous waste management plan is in compliance with all federal, state, and local regulations for the segregation, accumulation, storage, and disposal of hazardous waste.

The Subcontractor also certifies that any hazardous materials covered by the Agreement are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the DOT.

The Subcontractor has identified TBD as the individual who is trained and knowledgeable in DOT hazardous materials regulations. The Subcontractor shall notify the University in the event said person is no longer employed in the Subcontractor's company. In such an event, the Subcontractor furthermore agrees to identify a replacement with equivalent knowledge and training. Additionally, the individual identified above and any replacements shall maintain their applicable training certification status throughout the term of the Agreement, consistent with the requirement by DOT to renew such certifications every 2 years.

5. Penalties

If, during the term of the Agreement, a Subcontractor misses a sample holding time, loses or destroys a sample, misses a turnaround time, or issues suspicious analytical data results, the following penalties shall be enforced:

	Penalty
Missed Holding Time/Sample Loss or Destruction:	The University shall not pay for the price of any work performed on the sample, the Subcontractor shall reimburse the University for the cost of re-sampling, and the new sample shall be re-analyzed at no charge to the University, on an expedited basis.
Missed Turnaround Time:	For missed turnaround time the University shall pay the price that is consistent with the receipt time frame, as defined in the Attachment 1 of the Agreement, Fixed Rate Pricing Schedule, with an additional reduction in price of 10% for every calendar day that the results are late past the longest defined turnaround time for that analysis.
Incomplete Analyses:	If, in the review of the technical data received from the Subcontractor, the University determines that they may be incorrect, the Subcontractor shall re-analyze the sample upon request. If the re-analysis results yield the same results as the questioned data, then the University shall pay the price of the re-analysis. If the re-analysis results differ by more than the stated uncertainty from the original results, the Subcontractor shall: (1) not bill the University for the price of the re-analysis, (2) determine which results they will validate, and (3) provide LLNL with a document of explanation that includes a root cause, corrective action, and corrective action to prevent recurrence.

6. Customer Service/Point of Contact

The Subcontractor shall be flexible enough to interact smoothly with multiple LLNL user groups having different regulatory agency requirements. There shall be several points of contact, usually one for each user group. Enclosure C to this SOW, the Contact List, is provided for the Subcontractor's convenience and shall be updated from time to time as needed. The Subcontractor shall provide a strong quality improvement focus, not only for its own methods and processes, but for LLNL's data specifically. The Subcontractor shall provide timely and cooperative resolution of issues in an open and forthright manner.

The Subcontractor shall assign and maintain a single individual to be the point-of-contact for each LLNL user group. The same person may be the point-of-contact for more than one group, but each point-of-contact is expected to become knowledgeable of the needs and requirements of the groups for which she/he is responsible. In general, this will mean that, at a minimum, the point-of-contact is expected to be reasonably familiar with important regulatory requirements in the environmental and waste management areas, such as RCRA and CERCLA, and with the analytical methods required by the user group, especially those contained in EPA SW-846.

The point-of-contact shall act as a facilitator rather than a gatekeeper. Although communication concerning samples and analyses between the Subcontractor and LLNL shall be handled primarily through this point-of-contact, there will also be times when communication among other individuals at the analytical laboratory and in the LLNL user group is necessary. The point-of-contact is expected to assist in arranging these interactions in a timely manner when required. When the point-of-contact is unavailable for more than 8 hours, the Subcontractor shall designate an alternate contact.

Additionally, the Subcontractor shall:

- Provide amended reports in a timely manner when necessary.
- Provide timely responses in operational situations where personnel and equipment may be standing by and direct costs are incurred with delays.
- Immediately notify the affected LLNL user groups when internal problems are identified which may have affected data over a certain period.
- Participate cooperatively with LLNL in the development of ongoing improvements in sample preservation and survivability during transport to the laboratory.
- Provide ready access to technical personnel for discussion and resolution of difficulties. Technical personnel should be prepared to disclose fully the analytical details needed to resolve the problem.
- Cooperate in an investigation of possible laboratory contamination when warranted, for example when routinely non-detect parameters abruptly appear to have measurable values.

7. Sample Transportation

a) Courier Service

Those Subcontractors who are required to do so by their Agreement shall provide courier service for pickup of samples at LLNL's Main Site and remote site, Site 300. The courier service may be required to provide pickups 7 days a week. The Subcontractor courier service shall deliver samples to the Subcontractor’s facility within 4 hours of taking receipt. If permissible by the

Agreement and where Subcontractor courier service is not available, a commercial courier that has access to LLNL Main Site and Site 300 (e.g., Federal Express, UPS, or Emery) may be used at the Subcontractor's expense, as stated previously. A Subcontractor using a commercial courier shall supply pre-printed shipping forms (Federal Express, UPS, Emery, etc.) with its valid account number. The commercial courier must be able to deliver samples to the Subcontractor within 24 hours from time of pickup. For samples delivered by commercial courier, turnaround time calculation shall start 24 hours after the sample leaves LLNL's facility via a commercial courier, or upon the verified time of sample receipt at the Subcontractor's facility, whichever comes first. For samples delivered by the Subcontractor's courier service, turnaround time calculation shall begin 24 hours after notification of the need for sample pickup, or the verified receipt at the Subcontractor's facility, whichever comes first. For requested turnaround times of 24 hours or less, the start time shall begin at the time the sample is picked up at LLNL.

Subcontractor couriers shall not repack coolers. When handling samples, the Subcontractor shall follow all of LLNL's chain-of-custody procedures.

b) Shipping Materials

When requested by LLNL, the Subcontractor shall provide, at its expense, pre-cleaned sample coolers or boxes, temperature blanks, DOT-approved shipping containers (if required), and reusable cooling material (e.g., blue ice packs). If not provided by the Subcontractor, coolers, boxes, reusable ice packs, bottle shipping materials and DOT containers, etc., shall be returned at Subcontractor expense, by the next working day, to the point-of-contact for that sample shipment. The exact cooler and its shipping materials and temperature verification bottle shall be returned to LLNL in a clean, dry, usable condition, free from any visible residue, consistent with good QA/QC practices. It is the responsibility of the Subcontractor to permanently and prominently mark and identify supplies (e.g., lab name and container or cooler number) at the time of purchase. Otherwise, these supplies may not be identifiable for return upon termination of this contract.

The Subcontractor shall also provide certified, clean sample containers (e.g., nalgene bottles) at its own expense, when requested by LLNL. Sample bottles should be cleaned and processed to meet EPA-approved protocols. Only Level 1 lab ware with chain-of-custody documentation shall be accepted. LLNL shall have the option of ordering bottles with or without acid/base for sample preservation and with or without labels affixed. Waterproof sample labels shall also be provided at the Subcontractor's expense. The Subcontractor shall provide deionized, analyte-free water for field blanks and trip blanks. Additionally, the Subcontractor shall track lot numbers of acid/bases used for preservation, sample container lot numbers, as well as the quality of deionized water used for blanks. This information shall be made available to LLNL if requested.

c) Temperature Verification

If the shipment does not contain a temperature verification bottle, the Subcontractor must verify the arrival temperature by following a specific procedure approved in the pre-award audit or later prescribed in writing. If the shipment contains a temperature verification bottle, the temperature of that bottle must be recorded immediately upon unpacking. Verification may be made by recording the temperature of the thermometer in the bottle or, if there is no thermometer, using an LLNL-supplied thermometer to do the measurement. An LLNL-supplied thermometer must be examined to verify that there is no break in its mercury column. If there is a break in the column, the temperature of the liquid in the bottle must be measured immediately, unless enough time has passed that the liquid temperature already exceeds 6˚C. In that case, the Subcontractor is to proceed as if no temperature verification bottle was supplied and use the internal procedure mentioned above. The Subcontractor must use a certified thermometer that is NIST-traceable and is checked for accuracy on a regular basis.

d) Sample Condition

Upon delivery at the Subcontractor's facility, verification of arrival and sample status shall be confirmed by phone or fax. In addition, if phone confirmation is initially used, a hard copy confirmation must be supplied at Subcontractor expense within 24 hours of receipt. This confirmation shall include but not be limited to: sample breakage/leakage status, sufficiency of sample volume for proper analysis, temperature verification, excessive headspace, and chain-of-custody identification and condition.

e) Sample/Shipment Failures

If the Subcontractor fails to perform a conclusive temperature verification at time of receipt, so that the sample must be destroyed instead of being analyzed, the Penalties section (Section 5) shall apply. Analysis of samples that exceed 6˚C must be negotiated by phone on a sample-by-sample basis and confirmed by the Subcontractor by hard copy within 24 hours.

(END OF ATTACHMENT 2)

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